

Eosinophil Count: Parameter to Assess the Psychological Stress

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ABSTRACT

Background: Human body is endowed with an enormous capacity to cope up with stress. Body's entire machinery work together to achieve the goal of maintaining the homeostasis. Stressful situations have also become a part of life and both physical and psychological stress are subjected to body response in different ways. Stress is defined as nonspecific response of the body to any demand. Most of the time such stress is psychological one. **Aims & Objectives:** This study was conducted to see the effect of psychological stress in young students, to evaluate the magnitude of stress under different grades and to identify the students more vulnerable to stress. **Methods:** The present study was conducted on first year students of Medical College in Meerut. Pulse rate and Eosinophil count were measured of all the students during various periods. **Results:** Pulse rate was increased significantly in all the subjects of either sex before the examination and Eosinophil count was decreased significantly in all the subjects of either sex. **Conclusion:** In our study a compare of eosinophil count was made among the students in various phase of psychological stress. All the changes in stress occur probably due to stimulation of sympatho-adrenalin activation via hypothalamo-pituitary-adrenal axis (HPA axis). We must focus on stress-free environment in schools and colleges.

Keywords: Eosinophil count, HPA axis, Psychological stress.

INTRODUCTION

Today, in the era of competition, the mental stress among students is increasing day by day in all age groups. Stress is defined as nonspecific response of the body to any demand. Most of the time such stress is psychological one, the probable reasons might be peer pressure, school /college environment and/or due to yet some unexplained reasons (Lazarus and Folksman 1984).

Moreover such study induced stress among students performing professional studies is of greater magnitude than academic ones as it is directly linked with their careers. In recent years it was observed that such stress often produces some undesirable effects on students which have reached to alarming stage as witnessed by ever increasing number of students who approached for treatment of such stress induced conditions like fatigue, depression, insomnia, mania-schizophrenia etc.^[1]

As stated above, the non specific response due to stress is produced by the stressor. Stressor is an agent which produces stress and attempts to alter the

internal environments eg : infection, or low temperature, radiation injury, neuromuscular fatigue, emotions, environmental pollutants and so on. The stress response was also thought to have three characteristic stages—the “General adaptation Syndrome”.^[2] Walter B. Cannon suggested that rapid activation of homeostatic systems—especially of what he called the “sympatho-adrenal system”, preserves the internal environment by producing compensatory and anticipatory adjustments that enhance the likelihood of survival.^[3]

MATERIALS AND METHODS

The present study was conducted in the Department of Physiology, LLRM Medical College, Meerut on 1st year MBBS students. Total 69 students were selected (39 male and 30 female students) who gave their consent for participation. A detailed history of their academic performance and clinical examination was recorded viz: name, age, sex, height, weight, pulse rate, eosinophil count in a predesigned proforma.

Inclusion criteria

First year medical students of either sex of age group 17-24 years.

Exclusion criteria

Students having any cardiac disease, any psychological disorders, any respiratory disease or

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any family history of psychologiacal disorder were excluded from this study.

Parameters included were:

- Pulse rate
- Eosinophil count

The subjects for the study were selected from the 1st year medical students. Every student was evaluated for personal and family history, socio economic conditions, academic performance and examined physically for height, weight, age, sex. Control readings were taken after the admission of students when there was no exam for two months. Same parameters were recorded two days before their terminal and professional examinations. Pulse rate was recorded on poly graph & manually by palpating the radial artery. For Eosinophil count, blood samples were taken from pricking the finger and immediately prepared a blood film and stained it with Leishmanns stain and counting was done by using compound microscope. And data was analyzed statistically by applying paired t test. Approval from the ethical committee was taken.

RESULTS

There was a significant rise in pulse rate in all subjects under varying levels of exam's stress ($p<0.01$)

There is a significant fall in the number of eosinophil all the subjects ($p<0.01$)

Table 1: Age and Sex Distribution Of Cases

Age Group (years)	Male	Female	Total
≤19	15	18	33
20-21	19	12	31
>21	5	0	5
Mean ± SD	13±7.21	10±9.17	n= 69

Table 2: Effect of Psychological Stress (Examination) on Pulse Rate (beats/min)

Age Group (years)	Pulse Rate (Mean ± SD)			
	n	Basal	2 Days before Terminal	2 Days before Professional
≤19	33	74.58 ±3.63	78.39 ±3.46	86.33 ±5.72
20-21	31	75.13 ±3.90	78.03 ±3.58	86.87 ±5.73
>21	5.0	74.60 ±2.79	77.80 ±2.77	83.00 ±4.85
Total	69	74.83 ±3.67	78.19 ±3.44	86.33 ±5.67
p value			< 0.01	< 0.001

Table 3: Effect of Psychological Stress (Examination) on Eosinophil Count (cells/mm³)

Age Group (years)	Eosinophil Count (Mean ± SD)			
	N	Basal	2 Days before Terminal	2 Days before Professional
≤19	33	3.21±0.26	3.18±0.26	3.14±0.26
20-21	31	3.24±0.26	3.22±0.25	3.19±0.25
>21	5.0	3.26±0.40	3.23±0.40	3.20±0.40
TOTAL	69	3.25±0.30	3.21±0.25	3.18±0.30
p value	-	-	< 0.01	< 0.001

DISCUSSION

It is believed that pathophysiology leading to increase in ACTH secretion to meet emergency situations, are mediated almost exclusively through hypothalamus via release of Corticotropin Releasing Hormone (CRH).^[4] CRH is a polypeptide which is secreted in the median eminence and transported in the portal hypophyseal vessels to the anterior pituitary, where it stimulates ACTH secretion. If the median eminence is destroyed, increased secretion to many different stresses is blocked.

The aim of the study was to observe the changes in the measured physiological parameters during the period of increasing stress on two examination of different nature-one internal and the other being university examination as compared with nonstressful period (controls).

The reason behind this change concluded was increased amount of cortisol level. The cortisol is known to possess increased scavenger action on eosinophils.^[6]

Therefore, the present study revealed that examination induced psychological stress does cause changes in many physiological variables, probably due to an increase in sympathetic nervous system or adreno cortical and medullary hormones or a combination of both. All the changes are within physiological limits. Ethnic, racial or climatic factors may also play an important role in psychological stress.

CONCLUSION

In our study a compare of eosinophil count was made among the students in various phase of psychological stress. All the changes in stress occur probably due to stimulation of sympatho-adrenal activation via hypothalamo-pituitary-adrenal axis (HPA axis). We must focus on stress-free environment in schools and colleges.

REFERENCES

- Ballard ME; Cummings EM; Larkin K.; Emotional and cardiovascular responses to adult angry behavior and to challenging tasks in children of hypertensive and normotensive parents. Children of hypertensive and normotensive parents. Child Dev. 1993 Apr; 64 (2), 500-15.
- Carmel S, Bernstein J. Perceptions of medical school stressors, their relationship to age, year of study and trait, anxiety. J Human Stress 1987 Spring; 13 (1) : 39-44
- Herman JP, Figueiredo H, Mueller NK, Ulrich-Lai Y, Ostrander MM, Choi DC, Cullinan WE 2003 Central mechanisms of stress integration: hierarchical circuitry controlling hypothalamo-pituitary-adrenocortical responsiveness. Front Neuroendocrinol 24:151–180
- Aguilera G 1994 Regulation of pituitary ACTH secretion during chronic stress. Front Neuroendocrinol 15:321–350
- Armario A, Martí O, Molina T, DePablo J, Valdés M. Acute stress markers in humans response of plasma glucose, cortisol

- and prolactin to two examinations differing in the anxiety they provoke. *Psychoneuroendocrinology* 1996, Jan; 21 (1) : 17-24
- 6. Laura C Meagher, Joanne M Cousin, Jonathan R Seckl, Christopher Haslett .156(11), 4422-4428, 1996
 - 7. Alexander SL, Roud HK, Irvine CHG 1997 Effect of insulin-induced hypoglycaemia on secretion patterns and rates of corticotropin-releasing hormone, arginine vasopressin and adrenocorticotrophin in horses. *J Endocrinol* 153:401-409
 - 8. Bethin KE, Vogt SK, Muglia LJ 2000 Interleukin-6 is an essential, corticotropin-releasing hormone-independent stimulator of the adrenal axis during immune system activation. *Proc Natl Acad Sci USA* 97:9317-9322
 - 9. Bhatnagar S, Sun LM, Raber J, Manes S, Julius DMF, Dallman MF 2004 Changes in anxiety-related behaviour and hypothalamic pituitary adrenal activity in mice lacking the 5-HT-3A receptor. *Physiol Behav* 81:545-555

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